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Chaos and Costs

When the five day week was instituted, this office, in common with those of our readers, was inundated with notices to the effect that innumerable works would be closed on Saturday mornings for the receipt and despatch of goods. A serious situation has thus arisen, and it is of such a magnitude that the C.F.A. has devoted considerable space to the subject in their Transport Advisory Panel Bulletin No. 9. It appears that to overcome their end of the problems consequent upon the changeover, the railway companies would have to acquire an additional 100 locomotives and 100,000 wagons. The road hauliers are equally embarrassed, as the new conditions make it impossible for them to send goods a long distance on Friday afternoons, and unless there is a reasonable chance of unloading the lorry before finishing time, the work will not be started. Thus loads collected on a Friday will have to remain on the vehicles until Monday. Long distance lorries used to make three return journeys per week, now they will be reduced to two. This is a thirty three per cent. loss in efficiency.

The loss to industry is cumulative, as pressure on the railway and road hauliers may compel them to reserve Mondays for the handling of perishable goods only. This is happening now during the months which favour road transport; further deterioration will be experienced in the winter The article, which we have paraphrased, rightly asserts that on a long term basis, the five day week is a failure. As a short term policy, it advocates that firms should provide a staff to work on Saturday mornings for the handling of inward goods at least. If goods can also be despatched so much the better, both in the firm's and in the nation's interest. Such happenings as the transport hold-up have two effects, the lowering of industrial efficiency and the ultimate increase in manufacturing costs. As we pointed out three weeks ago, costs for all raw materials will reach levels previously undreamed of.

The founder with a pre-war weekly turnover of £200 is now probably averaging £1,000. Potential profits and losses are consequently of a greater magnitude, and any errors can soon reach serious proportions. The C.F.A. has the ironfounding industry as a whole very much at heart, and it is certain that a wider use of their " Cost Ascertainment " book will do a great deal of good in promoting realistic selling prices. Moreover, it will, if comparisons with other concerns be made, show up weakness or strength in manufacturing processes. The policy of the C.F.A. is to make the book available to *all* ironfounders, but naturally it must recoup the cost of production, and it is being sold from the Association's office at Derbyshire House, Belgrove Street, London, W.C.1, at a price so reasonable that as an insurance against either over- or under-charging one's customers it is indeed a light premium to pay. It is neither necessary nor desirable that the smaller jobbing shops should slavishly follow the complete system, but it is essential they should use the basic principles enunciated. If they experience difficulties, they should, whether they be members or not, state their case and obtain advice from the C.F.A. The staff will indicate what items can be assembled into one unit so as to effect simplification. We think that a few notes as to how this could be undertaken should be incorporated in future editions.

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Forthcoming Events

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

SEPTEMBER 29.

Institute of Welding.

North London Branch:—"Flame Cutting Developments," by R. E. Dore, at the Branch Library, High Road, Seven Kings, Ilford, at 7.30 p.m.

OCTOBER 4.

Institute of Production Engineers.

Yorkshire Graduate Section:—"Production Control," by J. P. Kenyon, at the Great Northern Hotel, Leeds, at 2.30 p.m.

Institute of British Foundrymen.

Lancashire Branch:—"Laboratory Control in a Light Alloy Foundry," by E. J. R. Mitchell, at the Engineers' Club, Albert Square, Manchester, at 3 p.m.

Wales and Monmouth Branch:—"Gating and Risering of Iron Castings," by G. L. Jones, with a ciné film. At the Engineering Institute, Cardiff, at 6.30 p.m.

House Organs

A New House Organ

The Aluminium Development Association, 33, Grosvenor Street, London, W.1, have issued No. 1 of the *Aluminium Courier*. It is to appear quarterly and each issue is to deal with a specific field in which aluminium has been, is being, or could be used. The initial bulletin deals with structural engineering and building. Included in the contents are articles covering the outstanding properties of aluminium as a structural material (this is particularly well presented); aluminium in building practice; and spot welding.

The Whiting Founder, July, 1947

Published by the Whiting Corporation, Harvey, Illinois, U.S.A.

This issue is largely made up of an article by Mr. A. W. Greeg, who deals with mechanical melting methods for foundries. Cupola practice is well reviewed, and the statement that 40 per cent. of the furnaces in the States are over 20 years old is of interest. The leaderette suggests the following fundamentals for operating a foundry: (1) organise, which means having the right man in the right place; (2) deputise, which is to give the man full authority to do the job you hired him for; and (3) supervise, which means you keep going like hell after the whole gang to see they do their job. Beyond the clash of ideas in numbers 2 and 3, this is quite good.

Precision Castings

We are indebted to Mr. A. Dunlop for the following corrections to his remarks in the discussion at the Nottingham I.B.F. Conference on "Precision Casting," published in our issue of August 14, 1947:—

The mould investment given on page 337 should read: "7 lb. sillimanite sand (four parts 30-mesh, one part *circa* 200), and 600 cc. meths. and 200 cc. silicon ester containing 1 per cent. of piperidine." The remarks given on page 339 relating to pressures used in America to obtain sound wax patterns, should read: "Pressures up to 100,000 lb. per sq. in."

Book Reviews

The Management Leader's Manuel. Edited by J. O. Rice and M. J. Dooher. Published by the American Management Association, 330, West 42nd Street, New York 18, N.Y. Price $3.

Whilst the world is talking about capital and labour, the man in the street forgets about management, which supplies the opportunity for the worker and the profit for the capitalist. This book, which is presented in blue leatherette with a spiral binding ranks amongst the most interesting the reviewer has ever read. Yet in truth it is a cocktail of high grade, well-thought-out psychology and elementary tripe. A number of authors have contributed to its various sections and the value of their contributions is by no means uniform. The book opens with management leadership in a democracy and the seven articles in this section are excellent. The second section carries three articles on human relations and it not quite so good. The third carries one story on listening to the troubled employee. There is a long conversation between Mr. Zurch and Miss Winkler in which every rule of good management is broken. Mr. Zurch, and not Miss Winkler, should have been "on the carpet." This conclusion is shared by the author and reviewer. In one of the last articles, there is listed a set of fifty questions as to the personal effectiveness of foremen. By the time the information was half assembled, the chief would either discharge the man or give him his own job and himself resign. However, British and Americans are so totally different that their psychological approach to these problems is not always on the same lines. In general, the book is of importance and interest to British management.

The Other Battle, by Donovan M. Ward. Published by The Birmingham Small Arms Company, Limited, Small Heath Works, Birmingham. Price not stated.

The book of 180 pages is a history of the Birmingham Small Arms Company, Limited, with special stress laid upon the war activities of the firm and its associated companies. The business was established in 1861, and emulated Enfield, which had been founded at the beginning of the century, in the use of machinery. The story of the recent war effort starts with Chapter VII, and continues right through to Chapter XXVI. Throughout, the human element is constantly introduced with good effect, for the Author is an accomplished writer. As the book takes the form of a novel, it is too much to expect an index, but as Wm. Jessop & Sons, Limited, Sheffield, is not an unimportant part of the B.S.A., the reviewer did expect to read something of their effort. However, it may be that a separate publication will be devoted to their activities. The book is a really worthwhile publication, for the effort made by this and other great British manufacturing concerns was of an epoch making character. It must be stressed that 100 per cent. war profit tax was in being. The reviewer suggests that a price should be charged for such a work, the proceeds might usefully be devoted to some internal charity.

V. C. F.

A New Automatic Moulding Machine

Visitors to the recent exhibition at Olympia were attracted by the possibilities of an automatic moulding machine shown on the stand of Stone-Wallwork, Limited, of 157, Victoria Street, London, S.W.1, and illustrated in Fig. 1.

An entirely new conception of foundry production is opened up. Hitherto every moulding machine has required its individual operator, and output has been dependent on a series of manual operations. Such limitations in no way apply to this new machine in which the full cycle of operations automatically follow in their correct sequence on the pressing of a push-button. The logical outcome of this development is battery operation, with opportunity for very marked economy in labour.

One such battery might consist of, say, eight of these machines in line, with empty boxes brought to the machines by pendulum conveyors from the knock-out station, with sand brought by overhead hoppers, and with the finished moulds taken away by conveyors. Two operators could handle such a battery—one transferring boxes to the machines and merely pressing the starting push-button of each, and the other removing completed moulds on to the conveyors.

Another scheme might be represented by a battery of four machines around a rotating disc fed with sand through an overhead hopper, the sand being automatically ploughed off the disc into the boxes on the tables of the machines, With such an arrangement one attendant might reasonably keep four machines in constant operation. The whole would constitute a small mechanised foundry unit, complete in itself, of high productivity, inexpensive to instal and remarkably economic in operation.

Space limitations at Olympia precluded the installation of sand hoppers, so that the effectiveness of the machines there shown must be judged on the basis of single machine operation with sand filling by hand. It will be seen that, even without the labour-saving possibilities of battery operation, the equipment offers marked advantages in production. Definite operational times are maintained from mould to mould as a function of the machine, and without any sense of effort or strain. The maintenance of this time cycle ensures uniformity of ramming and consistency of moulds, irrespective of the human element. Equally important is the obvious fact that, with such complete simplicity of operation, the necessity for any form of training is virtually eliminated.

When the operator pushes the starting button, the motor-driven control unit, shown in Fig. 2, comes into

(Continued on page 66, Col. 2)

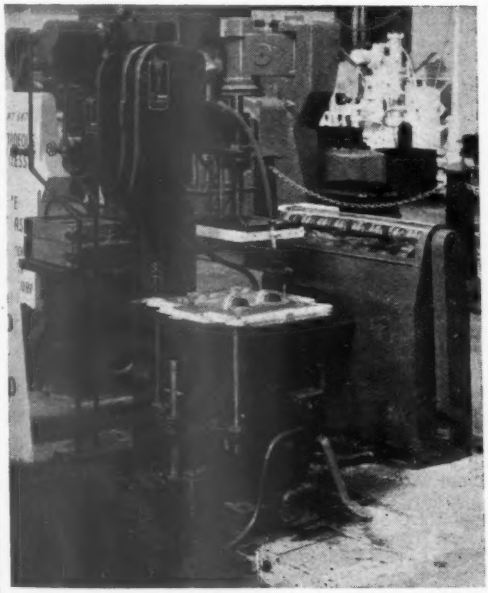


FIG. 1.—AUTOMATIC MOULDING MACHINE ON SHOW AT OLYMPIA.

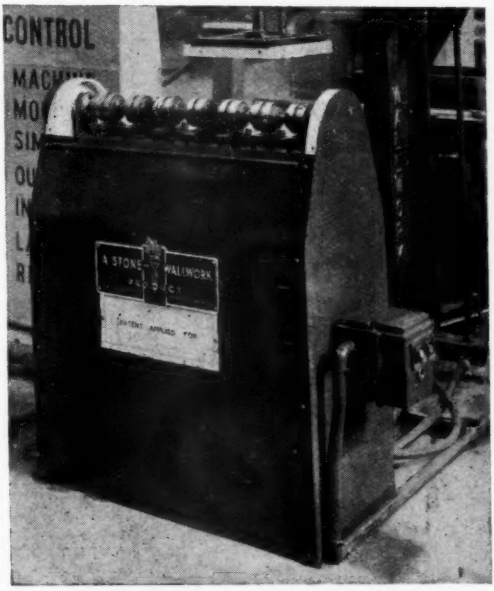


FIG. 2.—CONTROL UNIT FOR THE AUTOMATIC MOULDING MACHINE.

Pattern Construction

By "Chip"

One of the problems, often confronting a pattern-maker, is how to get the necessary rigidity and strength in the pattern with the materials on hand, and ways and means have to be adopted to counteract the natural tendency for timber to warp and split easily along the grain.

Most types of bracket pattern are built on a plate forming the thickness of the back. In the case of a bracket, as Fig. 1, the grain of the plate would be in the vertical at A. This means that a very delicate piece of "short grain" is left at B and C. To avoid this, the plate can be made off to the dotted lines and the member D let down over it as Fig. 2, where E shows the better way.

The segmental construction is often adopted for strength and in a case of Fig. 3, which is a portion of the pattern for a small cast steel drum, in which the flange is too thin for a double row of segments and thus would be very delicate if made of one row of the usual way of the grain, a different technique has to be adopted.

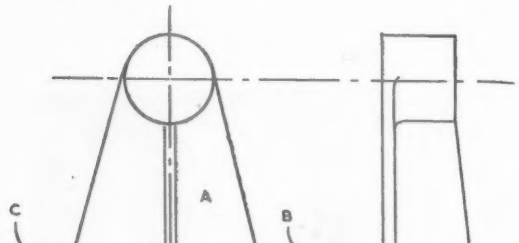


FIG. 1.—USUAL METHOD OF CONSTRUCTION.

FIG. 2.—IMPROVED CONSTRUCTION.

FIG. 3.

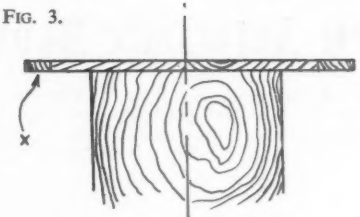
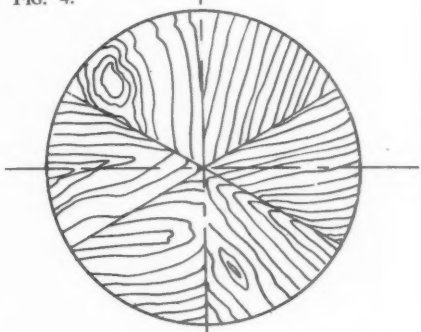


FIG. 4.



FIGS. 3 AND 4.—DRUM PATTERN.

Fig. 4 shows a plan view of the method employed, in which the segments are cut from the long way of the grain and run towards the centre. For thin flanges of this nature, this method is very suitable, but care has to be exercised in turning, to ensure a clean edge at X, as end grain is here exposed for all the circumference.

A New Automatic Moulding Machine

(*Continued from page* 65.)

operation and takes complete charge until the cycle of moulding operations has been completed—after which the motor is automatically knocked off. The actuating element in the control unit is a cam shaft carrying a series of small cams, beneath which is a row of rockers. Below these are pneumatic valves each operated by the rocker above it. Each valve controls the inlet and exhaust of compressed air to and from the machine for the starting and stopping of each operation in the sequence required to produce a finished mould.

These operations are: (*a*) Filling the box with sand; (*b*) swinghead brought over the table and the jolting commenced; (*c*) jolting continued simultaneously with squeezing; (*d*) the squeeze is exhausted and the swing-head starts to move away from the table; (*e*) vibrating; (*f*) pattern draw; (*g*) motor knock-off. At the conclusion of this cycle of automatically controlled operations the completed mould is ready to be removed from the table.

The Influence of Production Flow on Moulding Methods in Iron-Foundries*

By R. C. Shepherd

(*Concluded from page* 51.)

Medium Work

It is difficult to define exact lines of demarcation for medium work, between light work on the one side and heavy moulding on the other. Broadly, it has been taken that any job too heavy for a two-handed lift brings it into the medium group and that the capacity of the jolt strip (or separate strip) machine used or available determines the maximum size of the job. This work group has been divided into two main categories, repetition quantities and batch and small production quantities, see Charts IV and V.

Mechanised production methods have been fairly commonly applied to medium sized repetition work and many well known units are successfully employed for making such parts as domestic baths, crankcases, boiler sections, etc. Units of this description are so specialised and well-known that it is not proposed to dwell upon them in any great detail. Suffice to say that the remarkable P.M.H. values obtained are envied by those other sections of the industry who have to deal with batch production work of a variable nature. Mechanisation has not been adopted so generally for this latter type of work and it therefore offers good possibilities for improved P.M.H. and conservation of skilled labour.

Medium Size Repetition Work

Reference to Chart IV shows this category has been divided into three main sections: (1) single operation machine mould making; (2) multiple operation mould making, and (3) moulds assembled from cores. The choice of mould making procedure depends mainly on the time period this operation takes for any particular job. Where the operating time is short it is advisable to perform the complete job (half mould) on one combined jar-ram strip machine. Where, owing to the nature of the job, the mould making operating time is prolonged, then combined jar-ram strip machines give a restricted output, and breaking down becomes advisable. The first step is generally to resort to a double operation of separate ramming and pattern stripping. Usually ramming is done by Sandslinger in conjunction with patterns mounted on strip machines, which latter can either be fixed on the floor or mounted on a rotating table.

For jobs requiring a very extended mould making time further breaking down has to be considered, and this entails circulation of patterns in the unit. This procedure has been applied very successfully in the U.S.A. for suitable work in repetition as well as batch quantity production.

Single Operation Machine Moulding

Here pattern plates are mounted on combined jolt strip machines, on which every operation is performed, from the locating of the moulding flask to the final pattern stripping All subsequent operations can be planned for continuous working, on units similar in principle to those previously described for small work. Either roller or mechanical conveying can be used, the ultimate choice being largely decided by the required throughput. All units, however, must be adequately provided with mechanical lifting equipment for quick and regular handling.

Fig. 35 illustrates a typical completely mechanised twin unit laid out for the repetition production of 41 in. by 35 in. moulds. The output obtained is 40 to 50 moulds per hour for each unit, or a total of 80 to 100 for the twin unit. It is noteworthy that two separate

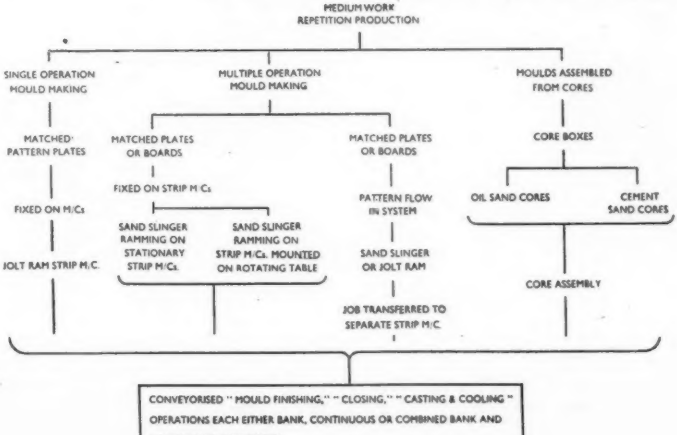

MEDIUM WORK
REPETITION PRODUCTION
SINGLE OPERATION MOULD MAKING
MULTIPLE OPERATION MOULD MAKING
MOULDS ASSEMBLED FROM CORES
MATCHED PATTERN PLATES
FIXED ON M/Cs
JOLT RAM STRIP M/C.
MATCHED PLATES OR BOARDS
FIXED ON STRIP M/Cs.
SAND SLINGER RAMMING ON STATIONARY STRIP M/Cs.
SAND SLINGER RAMMING ON STRIP M/Cs. MOUNTED ON ROTATING TABLE
MATCHED PLATES OR BOARDS
PATTERN FLOW IN SYSTEM
SAND SLINGER OR JOLT RAM
JOB TRANSFERRED TO SEPARATE STRIP M/C.
CORE BOXES
OIL SAND CORES
CEMENT SAND CORES
CORE ASSEMBLY
CONVEYORISED "MOULD FINISHING," "CLOSING," "CASTING & COOLING" OPERATIONS EACH EITHER BANK, CONTINUOUS OR COMBINED BANK AND CONTINUOUSLY OPERATED

CHART No. IV.

* Presented at the Nottingham Conference of the Institute of British Foundrymen.

Production Flow

mechanically-operated mould conveyors have been considered justified to service two pairs of jar-ram roll-over machines. The rammed drags and copes are finished and closed on the respective roller conveyors, the copes being lifted off and closed on the drag roller, after which the completed closed mould is lifted off and put on the mould conveyor for transport through the casting and cooling to the knock-out station.

Fig. 36 shows another unit, not so highly mechanised and with a correspondingly lower output volume. Drag and cope parts, 60 in. by 30 in. by 20 in., are simultaneously made on one large jolt roll-over machine and deposited on very light but strong bogies. The alternate drag and cope parts are hand-pushed through the finishing operations to an oil-fired drying stove, where each part receives 20 to 30 mins. drying. After drying, each part is finished and cored when the cope part is lifted off its bogie and closed on the drag, which is then hand-pushed through the casting and cooling lines to the shake-out. Empty bogies from the closing point and the shake-out station are returned to the ramming machines on a separate track. This unit was designed for making 32 very complicated diesel crankcases per day. Total personnel was sixteen.

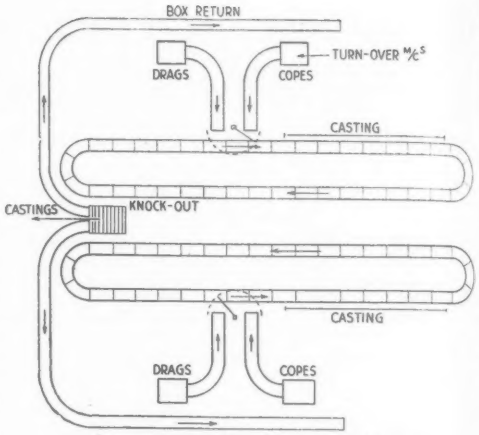


FIG. 35.—MECHANISED TWIN UNIT.

Multiple Operation Machine Moulding

(1) Separate Ramming and Stripping

(a) *Ramming by Sand Slinger with Patterns mounted on Fixed Strip Machines.*—Fig. 37 is a typical example of this system, which permits continuous uninterrupted working, as two strip machines are provided for each Sandslinger ramming unit. As one is being used for ramming the other is being stripped and prepared again for ramming. All subsequent operations can be planned to meet individual cases in regard to either continuous or banked operational working.

Fig. 38 is an example of a completely mechanised unit utilising the same principle as illustrated in Fig. 37. In this particular example two pattern stripping machines are used and serviced by one Sandslinger. Rammed drag parts, after stripping, are placed directly on to the mechanical conveyor, on which all finishing, torch skin drying and core setting operations are carried out. The rammed core parts, after stripping, are placed on the floor, where they are finished and similarly skin dried. From the floor they are picked up by overhead crane and closed on the completed drag part on the mechanical conveyor.

The speed of operation is planned to deal with an output of one part per machine every five minutes, and in consequence the conveyor is intermittently operated in cycles of ten minutes, corresponding to the production time needed for one complete mould. The output from this unit is therefore six complete moulds per hour, the size being 5 ft. 6 in. by 4 ft. 6 in. by 12 in. by 10 in. Casting takes place during the period the

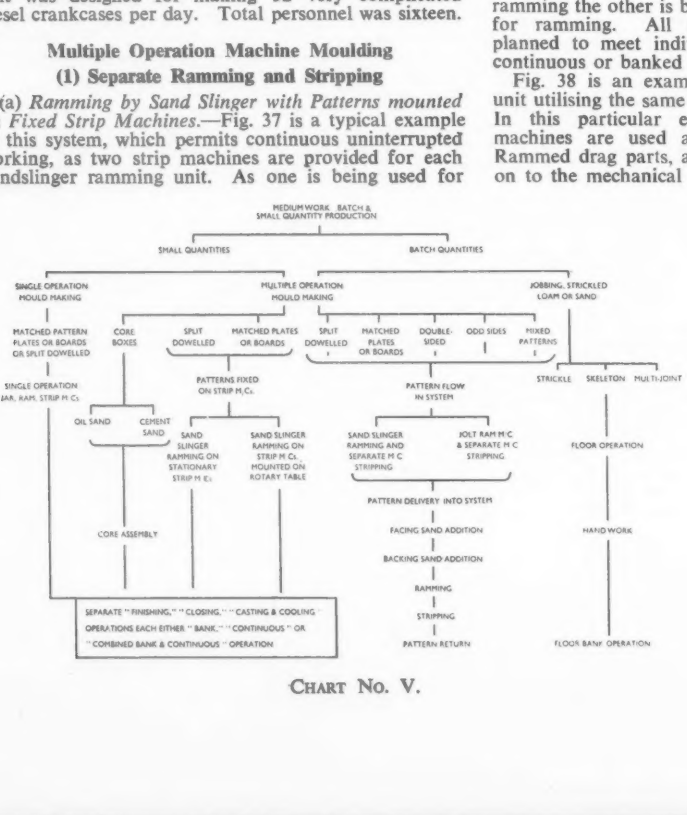


CHART NO. V.

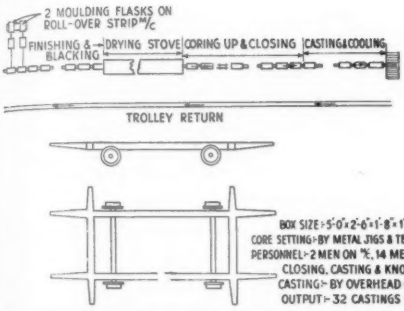

2 MOULDING FLASKS ON ROLL-OVER STRIP M/C
FINISHING & BLACKING
DRYING STOVE
CORING UP & CLOSING
CASTING & COOLING
TROLLEY RETURN
BOX SIZE :- 5'-0" x 2'-6" x 1'-8" x 1'-8"
CORE SETTING :- BY METAL JIGS & TEMPLATES
PERSONNEL :- 2 MEN ON M/C, 14 MEN BLACKING CLOSING, CASTING & KNOCKOUT
CASTING :- BY OVERHEAD CRANE
OUTPUT :- 32 CASTINGS PER DAY

FIG. 36.—PRODUCTION UNIT FOR ENGINE CRANKCASES.

conveyor remains stationary. Here again the elaborate nature of the installation is noteworthy having regard to the comparatively low output of moulds, but it is considered the P.M.H. obtained more than justifies the capital cost involved. There are, of course, many other possible variations of this principle, but these four examples serve to illustrate typical applications.

(*b*) *Ramming with Sandslinger with Patterns Mounted on Strip Machines Mounted on a Rotary Table.*—This principle has the advantage of permitting a multiple number of patterns to be worked simultaneously and also the operating time cycle allows some latitude for a reasonable amount of pattern changing. The diagrammatic layout illustrated in Fig. 39 shows a typical application of this principle. In this case eight separate strip machines are mounted on a rotary grid and a stationary Sandslinger is used for continuously ramming alternate drag and cope parts. After being rammed, each part is stripped and delivered to the next sequence of operations. In the meantime the half pattern, mounted on the strip machine, revolves the full circuit, during which time the pattern is cleaned, etc., and another moulding flask located, when it is again ready for ramming by means of the Sandslinger. Sand spillage from the Sandslinger drops through the rotary grid, on which the strip machines are mounted, on to an underground conveyor which by-passes it past the preparation plant, immediately back to the hopper feeding the Sandslinger.

The speed of mould production and the P.M.H. of this type of unit is almost directly controlled by the size of the job. In consequence, this controls the degree of both mechanical and manual servicing provided at each operating point. Where required, however, both large volumes and P.M.H. are obtainable with work of a suitable nature.

Fig. 40 is an example of a more highly mechanised unit utilising the same principle as that shown in Fig. 39. In this case the unit consists of a plate conveyor, inside which are two rotating circular tables. On each of these tables is mounted four turn-over stripping machines. One table is devoted to the production of drag parts and the other to the production of cope parts. Each of the two tables is serviced by a separate Sandslinger, the machines being devoted entirely to turning over and stripping. The operations of ramming, turning over, stripping and pattern cleaning are done in sequence. The finished drag parts are transferred directly to the plate conveyor on which finishing, skin drying and core setting is done, before reaching the closing station where the cope parts are closed on to them. It was claimed this unit is flexible enough to give 300 to 350 moulds per 8-hr. shift off four different types of pattern. The maximum size of mould is approximately 42 in. by 30 in.

(2) Pattern Flow

This procedure has been successfully applied in the U.S.A. for certain repetition applications. It consists essentially of breaking down mould making into such operations as preparing pattern; locating moulding flask; adding sand; ramming and stripping; all separately and simultaneously performed on a series of patterns in the system. It has been organised to such a degree that only three patterns are needed in the system to ensure continuous working, thus making it possible satisfactorily to apply this principle to even fast repetition work. It is not proposed to give any details in this section as the principle is described in more detail in the section dealing with batch production quantities.

Moulds Assembled from Cores

As coremaking is the principal operation involved it is not proposed to discuss this section and it has only been included for purpose of record.

Batch and Small Quantity Medium Work Production

Until fairly recent times the general practice has been to limit mechanisation and equipment to the employment of large turn-over ram machines, with overhead sand supply, for mould making and while this showed some improvement in P.M.H. over hand ramming methods the saving obtained was often very limited,

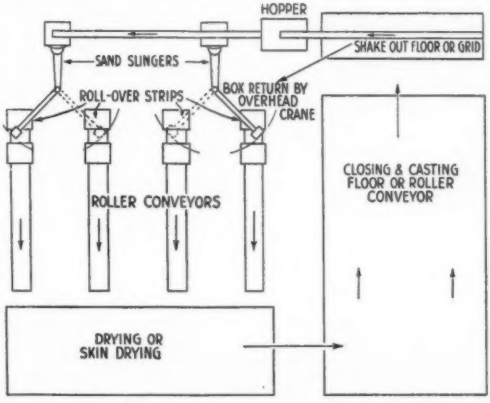


FIG. 37.—SAND-SLINGER UNIT WITH FIXED STRIP MACHINES.

Production Flow

particularly with work which necessitates keeping the job on the machine for extended periods. In view of this, the modern tendency is to confine single purpose machines to work of a semi-repetition nature and to apply production flow methods (which permit further breakdown of the moulding operation) to the production of work of a variable character.

For batch quantity production of uniform types of work requiring short machine operating times single operation machine moulding is quite feasible if thought is given to providing reasonably quick pattern changing devices. Where, however, a variable product in type and size is required, and where machine operating times are prolonged, then the mould making operation must be broken down to some degree or other in order to obtain the necessary flexibility. Generally speaking, the more the breaking down, the greater is the flexibility obtained. Time and operational studies are even of more importance in this larger class of work than with small work. The types and variation of product it is necessary to cater for on each individual unit must be studied in minute detail for each operation.

Chart V shows this category has been divided into two sections—batch production quantities and small quantity production.

Batch Production Quantities

Single operation mould making is a suitable procedure for jobs that lend themselves to quick overall operating times and so permit reasonable outputs per machine. It is also necessary to provide reasonably quick pattern changing devices so that different jobs can be produced without unduly holding up the output of the jolt strip machine. If more than say five minutes are required to complete one part on a machine then breaking down the mould making operation is worth consideration. Subsequent operations of finishing, closing, etc., can be planned in any combination of continuous and/or bank working to suit the particular work involved.

Fig. 41 shows a diagrammatic layout of the application of combined roll-over strip machines as used for mould making in work of a fairly uniform character.

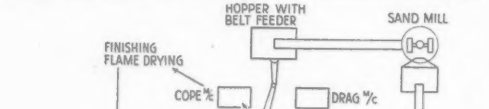


FIG. 38.—MECHANISED UNIT FOR ENGINE CRANKCASES.

The layout used for performing the subsequent operations depends on the nature of the work and the unit volume involved. Either floor, roller or mechanical conveying operation can be applied, but every consideration should be given to keeping floor working to a minimum and to utilising conveyorisation to the greatest possible extent, consistent with the necessary justification for it.

Multiple Operational Mould Making

(*a*) *Separate Ramming and Stripping.*

The same remarks apply here to those given under the same heading in the description of Repetition Production. Layouts similar to that shown in Figs. 37 and 39 are suitable and can be adapted to suit individual cases. For batch work, as distinct from repetition work, however, some variation in pattern equipment may be expected. This particular working procedure will successfully handle either matched plates or boards or even loose split patterns (with flat joints) on the jig dowelled system.

(*b*) *Pattern Flow* is a procedure which has been very successfully applied to mixed batch production work, particularly in the U.S.A., and is similar in principle to that described in the previous section on "Small Work Oddments Production," but owing to the large nature of the work, it offers even greater possibilities in obtaining increased P.M.H. and conservation of skilled labour.

As previously described, the principle of this method of working is the breaking down of the actual mould making into individual operations which can be simultaneously performed by separate operators with the aid of as much mechanical servicing as is possible or warranted. By doing this, the correct grade of labour can be allocated to each particular operation, thus conserving available skilled labour for work worthy of their training and craft. What is just as important is that production units can be built up having much greater flexibility in the way of a wider range of work (covering size, type and varying pattern equipment and quantities required) which can be handled. Single operation machine moulding is very limited by reason of the difficulty in handling miscellaneous pattern equipment, varying box sizes and frequent pattern changing.

The actual number of operating points or stations is influenced by a variety of factors. For instance, differing types of pattern equipment may cause some variation either in the number or sequence of operations. In some cases production flow investigation may indicate the need for doubling back the job to a previous station in order to avoid unnecessary duplication of mechanical equipment.

The job size, also, may affect the number of operating points. Often, the larger the job the more is the need for operational breakdown in order to reduce the operating time cycles to periods short enough to give a reasonable throughput. The type of job is another factor to be considered. Such points as mould finishing, liftering, feeding, core setting, green or dry sand working, section sizes, types of metal, job weights, have all to be taken into account before deciding on the degree to which the job as a whole is split up.

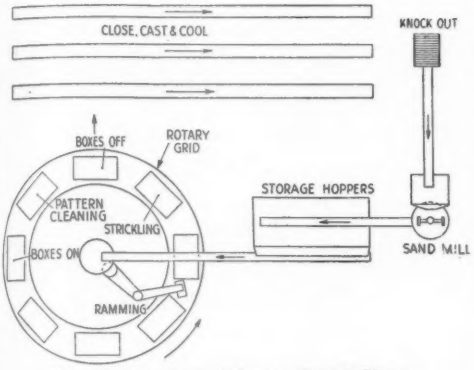


FIG. 39.—TYPICAL ROTARY TABLE UNIT.

The planned unit output (moulds per hour) is of course, one of the main points affecting the layout detail. Broadly, the more the job is broken down the bigger is the unit throughput, but this has to be balanced against the number of operators to ensure improved P.M.H. will be obtained. Unnecessary operating stations may increase the amount of labour out of proportion to the increased production obtained. Optimum P.M.H. values are only obtained when all personnel in the unit are perfectly co-ordinated and kept steadily and continuously at work.

Fig. 42 shows a typical layout which operates most successfully, producing a wide range of castings made in flasks up to a maximum size of 10 ft. 6 in. × 7 ft. × 44 in. In this case half wood-patterns, mounted on boards, are used. Note:—Units can be designed to take even one off jobs, using loose split patterns made on the jigged dowel system.)

These boards are dowelled on the underside to jigged dimensions and the patterns are located in relation to these jigged dowels. In operation, each pattern board is located (by means of the dowels) in a robust cast iron frame and secured by quick action bolts. The purpose of these frames is to provide the necessary support to the pattern boards during the heavy jolting operation to which they are subjected. On these frames are mounted the two fixed moulding flask locating pins. In this particular system eight standard sized frames (each having definite pin centres) were used to cover the various flask sizes required to meet the needs of the variation in the size of work the unit was required to accommodate.

As shown in Fig. 42, the next operation is to add facing sand from an overhead hopper while the pattern board on the iron frame is moving along on a mechanical conveyor. After this, other operators pack the facing sand round the pattern. Next the moulding flask is located on the frame pins and any liftering done. Backing sand addition is the next operation, after which the whole job is lifted on to a jolt machine and rammed. From here it is lifted off and put on to a separate roll-over strip machine. After stripping, the pattern is returned either back into the system or into the adjacent pattern storage. From the strip machine the rammed parts are put on the floor for finishing, etc., after which they are transferred to the drying stoves.

When dried, drag parts are taken to a separate closing floor, where they are cored up, etc. After drying, the cope parts are prepared for closing over a pit (in which the operators can safely do any necessary overhead work), and are then taken to the closing floor and located on their respective drags, and the finished closed moulds are cast *in situ* on this floor. As soon as possible after casting, the whole job is picked up and placed on a mechanical conveyor, which takes it through a cooling and fume exhausting tunnel to a large mechanical shake-out very efficiently equipped with dust exhaust equipment.

In this particular case the floor operation was employed in order to obtain maximum flexibility for a wide range of work sizes. Where the range of sizes can be limited by reason of the requirements or, alternatively, by operating several smaller overall units, then it is possible to reduce the amount of floor operation or banking.

This principle of pattern flow in circuit is very adaptable, as it is possible to employ practically any form of ramming or pattern stripping. Further, by allowing reasonable banking capacity between each mechanical operation, such variations in planned operation times as arise from differing box sizes, amount of core setting, etc., are averaged out and a uniform rate of feed is maintained. Not least in this method of operation is the advantage gained by the continual movement of jobs from operation to operation by planned time cycle routing, which prevents accumulations of work at any of the operating points and so ensures continuity of effort on the part of all the workers as distinct from spasmodic bursts of working.

Finally, well planned job routing from operation to operation results in the most economic use of mechanical equipment. Well designed P.F. units permit a maximum number of operators to be serviced by the minimum amount of equipment. For example, limiting the number of ramming stations simplifies pattern and sand delivery, flask return and mould disposal equipment, and also a smaller number of ramming machines are required for a given output than is the case when each set of operators has to do all operations on one machine. Unnecessary multiplication of equipment is, therefore, avoided in production flow units by reason of the lesser number of ramming

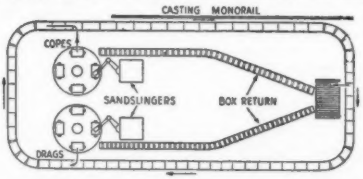


FIG. 40.—MECHANISED ROTARY-TABLE UNIT.

Production Flow

and pattern stripping stations required. At the same time, a total unit output can be obtained equivalent to that obtained by a battery of jolt strip machines (each of which has to be serviced by sand delivery, etc.), on which half-moulds are made from start to finish.

Jobbing Production

This section is shown in Chart V, mainly for the purpose of record. This type of work has, of necessity, to be performed on the floor, and it is not proposed to cover any of its aspects in this Paper. Nevertheless such work constitutes a very important part of the industry's activities, and there exists a definite lack of production capacity at the present time. Conservation of skilled labour in other sections of the industry holds out the best hope for increased capacity for jobbing work of this description.

Large Work Production

The line of demarcation between medium and large work must be somewhat elastic for the purpose of this Paper, but large work may be considered to include all jobs requiring, say, 1 ton or more of metal to cast. Another broad classification might include all jobs needing tackle too large to permit machine pattern stripping, although even this does not always apply as very large stripping machines are being used for certain specialised applications.

Chart VI shows this work group has been divided into two main categories, *viz.*, batch production and jobbing production. Although in the former category a great deal has been done by the larger foundries in providing specific mechanical equipment to aid such operations as sand delivery and ramming, the segregation of operations and operators is not commonly practised. It is suggested, even in large work, that scope exists for confining skilled operators to skilled operations and, to do this, job breakdown into individual operations, efficiently routed, becomes necessary. Thought and study along these lines will also assist

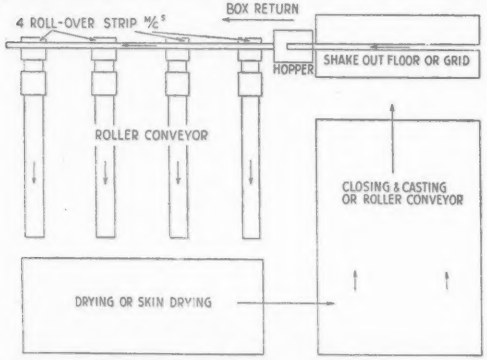


FIG. 41.—LAYOUT OF TURN-OVER MACHINES FOR BATCH PRODUCTION.

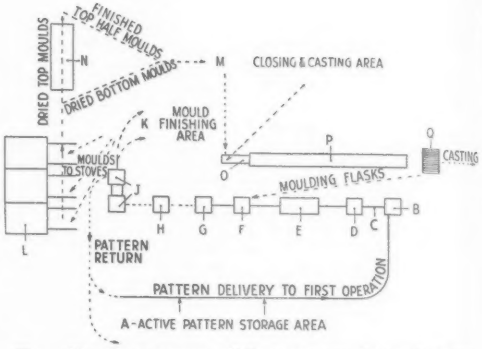


FIG. 42.—SEMI-JOBBING "PRODUCTION FLOW" UNIT.

A, Active pattern storage area; B, Pattern mounted on C.I. jolting frame; C, Conveyor; D, Facing sand addition; E, Packing sand and fitting lifters; F, Station for placing box on; G, Backing sand addition; H, Jolt-ram machine; J, Turn-over strip machine; K, Mould finishing; L, Drying stoves; M, Closing and casting area; N, Pit station for finishing and placing cores in top half; O, Conveyor removing cast moulds; P, Cooling tunnel; Q, Mechanical shake-out.

in showing how and where the most suitable mechanical equipment can be economically applied in the best interests of production and skilled labour conservation.

As in all other moulding work, operational servicing is of the utmost importance. This includes such points as provision of tackle, all moulding materials, cores, and the best possible lifting and transport facilities. Hold-ups in the provision of any of these services throws more work on the skilled producers and curtails their productive capacity. A prominent foundryman once suggested to the Author that a foundry service supervisor is becoming more and more necessary, in order to allow the floor supervisors (or foremen) being relieved of the responsibility for providing these services and so be able to concentrate upon their proper functions of maintaining scheduled production rates and the carrying out of the details of planned production methods. A very good case can be made out for this suggestion and it is submitted here as being worthy of consideration. The more important details of servicing can be considered in a review of the various operations involved in large moulding work.

The first job is to lay out and prepare the patterns (the actual details of which are controlled by the type of pattern equipment). Next, the moulding flask has to be provided and fixed. All this work involves considerable lifting, which is usually performed by overhead equipment. Any delay incurred by waiting for a lift adversely affects production and therefore no effort or reasonable expense should be spared in providing

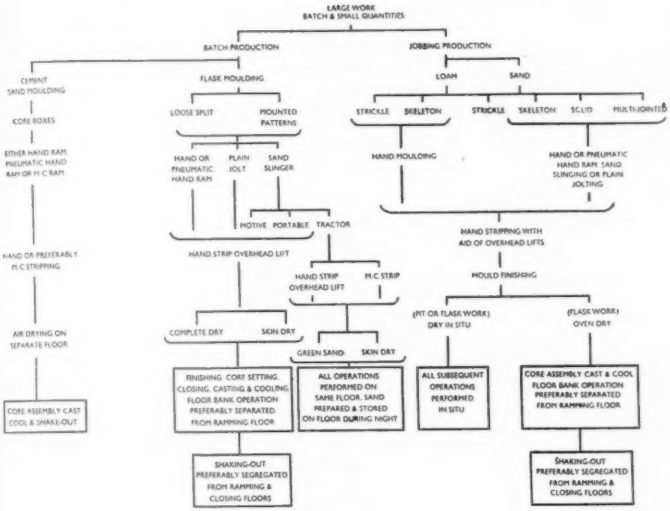


CHART NO. VI

enough mechanical lifting equipment. Further, there is no need for the skilled moulder to do his own fetching and carrying of patterns and moulding flasks. Under ideal conditions these should be delivered to him at the required moment and at the right place by the servicing labour squad. In this way, the capacity of the skilled operators can be most effectively utilised.

The most efficient way of providing both facing and backing sand to moulders must also be found. It is most difficult to do this efficiently where it is the practice to perform all operations on the same floor. After the ramming operation, no sand servicing is required and if the core setting and closing operations are performed in the same area where ramming is done, then interferences usually arise, which result in hold-ups and delays. Again, most foundry engineers know how difficult and expensive it is to plan efficient mechanical sand delivery equipment in existing shops where the whole area is split into numerous floors, each allocated to an individual gang for carrying out the job from start to finish. If the ramming area can be segregated, then the equipment needed for sand conveyance can be both simplified and cheapened. The same remarks also apply in those cases where sand is provided to a motive type Sand-slinger. A separate ramming floor limits the travel and operation of this machine to the particular area in which it is required.

Turning over and pattern stripping requires further overhead lifting service in the ramming area. Where possible, independent lifting facilities for pattern stripping is worth consideration. As soon as possible after finishing, the moulds should be taken to the drying stoves, in order to clear the ramming floor for the next job. To do this, sufficient mould drying capacity must be provided and, preferably, there should be enough ovens to allow drying to be done as each oven is filled. In order to prevent fumes being troublesome, the ovens should be segregated from the production floors, or provided with efficient extraction equipment, otherwise drying during working hours causes trouble.

After drying, the moulds should, preferably, be delivered to a separate closing and casting floor, where core setting, etc., can be performed by specialist operators serviced with independent lifting and transport facilities. As soon as possible after casting, the jobs should be lifted from the closing floor and transformed to a separate floor for final cooling and shaking out. Modern practice is to utilise high-pressure water sprays for removing cores and the sand is dealt with (either reclaimed or disposed of) by means of suitable mechanical equipment. This method of removing cores from castings helps in no small way to minimise, and even remove altogether, the dust problem associated with this dirty operation.

In Chart VI, *large batch production work* has been

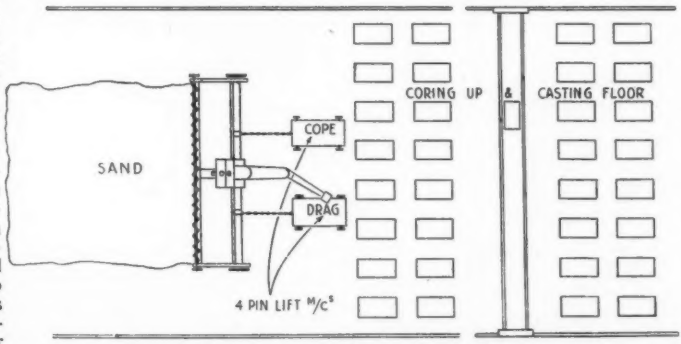


FIG. 44.—LAYOUT USING TRACTIVE-TYPE SAND-SLINGER.

Production Flow

sub-divided into cement sand moulding and flask moulding. It is not proposed to discuss the application of cement sand moulding to this class of work in any detail. It does, however, lend itself to the adoption of planned production flow operation, as it allows large work to be split up into comparatively small unit parts and, therefore, largely obviates the need for large and heavy moulding tackle. In many cases, mechanical core ramming and stripping is made possible by this method, thus permitting good production rates to be planned and maintained.

Although drying equipment is not necessary in operating this process, a comparatively large floor area, capable of being maintained at a controlled temperature, has to be provided, in order satisfactorily to air-dry the cement sand cores. Another difficulty is the hard and dusty nature of the sand after casting at high temperatures, which causes some mechanical problems in the shake-out operation. Owing to these points, it is sometimes difficult to apply this process to existing foundries unless they are capable of considerable modification. The process has, however, very good possibilities in regard to the future development of improved methods of foundry production.

Large flask moulding has been divided into three sections: (1) hand or pneumatic hand ramming; (2) machine jolting, and (3) Sandslinging. In all these cases pattern stripping is usually accomplished by means of overhead lifting equipment. This is the class of work particularly referred to in the introductory remarks in this section, where the provision of separate floors and operators are advocated for ramming, closing and shaking out. It will be seen that reference is made in Chart VI to a further sub-division into (1) complete drying and (2) skin drying. This latter is a comparatively new development for large work, but it has been very successfully applied to castings weighing up to at least seven tons.

In regard to Sandslinging, two developments are worthy of mention. The first is the "Speed Slinger," which is now very largely used in the U.S.A. and which takes away the arduous work usually involved in manually operating the slinger head over the job. The operator sits on a "plough saddle" seat over the ramming head and controls every movement of the machine by a single lever, similar in principle to the aeroplane "joy stick." Only those who have seen the machine working can fully appreciate the speed and ease of operation. Unfortunately, this machine does not appear to be available in this country, but there is a very great need for it in the future development of British heavy foundry work, as it seems to provide the answer to many of our problems. Fig. 43 illustrates one of these machines.

The second Sandslinger application which is used largely in the U.S.A. is the practice of dragging two large straight draw pattern strip machines behind the well known tractor type of machine, which picks up its own sand from the floor by means of a long worm screw. Fig. 44 shows a typical arrangement. This practice allows one floor to be used for all operations, but is limited to the class of work which can either be cast green or skin dried and which lends itself to a straight pattern draw. The usual practice is progressively to mould, skin-dry, etc., and cast, and to leave shaking out to night operators, who also prepare the floor sand heap for the next day's operation.

Another type of sandslinger is the well known portable type which can be picked up and taken to any job, with an overhead crane. The main drawback to this type is the need for manually handling the sand from the floor to the boot of the Sandslinger elevator. At least two men shovelling hard are required to keep the machine adequately supplied.

FIG. 43.—NEW TYPE OF SAND-SLINGER KNOWN AS "SPEEDSLINGER."

Large Work Jobbing Production

Here again a large potential labour saving lies in supplying the best possible servicing to the producers. As detailed in the previous section, this servicing mainly consists in the provision of adequate lifting capacity, the supply of all moulding materials, particularly facing and backing sands, already prepared, and organising the work so that it is moved as soon as possible from the production floor for either the drying or shake-out operations, to avoid congested working areas. It cannot be emphasised too strongly that clear working floors are of inestimable value in obtaining the highest possible output. In order to ensure this it is advisable, even in jobbing

work, to attempt to arrange, wherever possible, for separate operating areas for ramming and closing. This is, of course, not practicable where pit work is concerned as this involves doing everything *in situ* but it is quite practicable to do it with any sort of flask work. Chart VI indicates where this practice can be applied.

Acknowledgment

The Author wishes to express his thanks to the Directors of Ruston & Hornsby, Limited, for their kind permission to publish this Paper, and to his colleague, Mr. D. Killingworth, for his help, and to all those who have contributed to the preparation of this Paper.

Ventilation of an Electric Furnace

An effective smoke, dust and fume control from the 12-ton Héroult side-charge electric melting furnace at Rustless Iron & Steel, Baltimore, Md., has been obtained by the application of an exhaust hood. This hood employs the engineering principle of placing adequate induction at the point of generation, preventing dispersion to the melting room and immediate foundry area of dust and fumes.

The hood essentially consists of one section mounted on the lintels over the charging door, with a second section attached to the roof ring. Sufficient openings are provided around the electrodes and over the charging and slagging door to maintain an indraft at those points adequate to draw all generated materials directly into the exhaust hood. The collected materials are then conveyed to a "wet"-type dust collector before the clean air is discharged to the atmosphere.

The construction of the hood permits of its rapid removal to facilitate changing of furnace roofs and provides a positive means of smoke control with only a fraction of volume of the exhaust required where general ventilation is applied. Visibility of crane operators also is greatly improved.

Tellurium as a Densener

An article in the August issue of "American Foundrymen" details the use of Tellurium-blacking core washes for chill production in iron castings much on the same lines as discussed in the FOUNDRY TRADE JOURNAL, March 14, 1946. An additional point is made that the local chilling effect of Tellurium can be used to act as a densener for parts of castings, such as hinges on boiler sections, which are otherwise susceptible to porosity, so long as little or no machining is required at the chilled parts.

CHICAGO HEADQUARTERS of the International technical Society has announced that Mr. Charles E. Nelson, technical director of the magnesium division of Dow Chemical Company, Midland, Mich., will deliver the 1948 Charles Edgar Hoyt Lecture of American Foundrymen's Association at the A.F.A.'s convention and foundry show in Philadelphia next May 3-7. His subject is "The Control of Grain Size in Magnesium Castings."

The Liege Exhibition

The most unobservant visitor to Liège this summer cannot fail to appreciate that A.I.L. stands for something of importance. These letters adorn the tram-cars, are displayed across banners dominating the boulevards, in the shop windows and, in short, everywhere. They stand for l'Association des Ingenieurs sortis de l'Ecole de Liège, a body which this year is celebrating the hundredth anniversary of its inception. The exhibition has been done on a really large scale, and has involved a herculean effort. Primarily, the new University building, completed in 1938, had to be converted into an industrial and technical exhibition during the period of the students' vacation. At any time this would not be an easy task, but the buildings had received during the war hits from no less than eighty bombs! The exhibition housed in the various faculties, well organised exhibits of mining machinery, "metallurgie"—a word perhaps better translated as engineering rather than metallurgy—textiles, foundry and art and folk lore. In this last section, Mr. Rene Deprez had, with the help of some of his workmen, erected a wooden model of a malleable iron foundry as it existed a hundred years ago.

In both the mining and metallurgy sections there were many exhibits by well-known British manufacturers; they were especially prominent in the fields of heat-treatment furnaces, microscopes and laboratory ware. The foundry section was purely technical and beyond a machine for curling malleable test-pieces, there was little of outstanding interest to overseas readers. The distinguishing feature of Continental exhibitions compared with British is the lavish use of floral decorations and the employment of brilliantly executed cartoons as murals. Concurrently with the run of the exhibition, there were held a series of technical conferences on a multiplicity of subjects, something of the order of 700 Papers and reports being presented and discussed. In addition, visits to Belgian works were organised, but unfortunately, owing to a strike, those to the iron and steel works had to be cancelled. However, as no fewer than 80 Papers were presented in this field alone, there was ample to keep visitors busy.

Most remarkable was the co-operation of the city's shopkeepers. In every window there were exhibits taken from the local museums—muskets, pistols, gauntlets, all exhibiting outstanding craftsmanship. Others had hired artists to re-create Liège of 100 years or more ago in the form of window displays. Others, such as the book shops, exhibited old maps and wood cuts, whilst the balance contented themselves with the display of just one work of art. This outstanding manifestation was under the general direction of Mr. Léonard, the well-known foundryman, and visitors from all over Europe were unanimous in their praise of the work accomplished by this gentleman and his colleagues.

THE ART FOUNDRY of the Morris-Singer Company, of Ferry Lane, Forest Road, London, E.17, has been commissioned to cast Sir William Reid Dick's figure for the President Roosevelt Memorial.

Pig-iron and Steel Production in Great Britain

The following particulars of pig-iron and steel production in Great Britain have been extracted from the Statistical Bulletin for August, 1947, issued by the British Iron and Steel Federation. Table I gives the production of pig-iron and ferro-alloys in July, with the number of furnaces in blast at the end of the month; Table II, production of steel ingots and castings in July, and Table III, deliveries of alloy and non-alloy finished steel. Table IV summarises the activities of the steel industry during the six months ended July, 1947. The monthly figures relate to five weeks.

TABLE II.—*Weekly Average Production of Pig-Iron and Blast-furnace Ferro-alloys, July,* 1947. (Thousands of Tons.)*

District.	Furnaces in blast, 2.8.47	Hematite.	Basic.	Foundry	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts, Northants, and Essex	26	—	15.1	21.5	0.8	—	37.4
Lancs. (excl. N.W. Coast) Denbigh, Flints., and Ches. / Yorkshire (incl. Sheffield, excl. N.E. Coast)	5	—	5.2	—	—	0.7	5.9
Lincolnshire	11	—	16.8	0.5	—	—	17.3
North-East Coast	23	5.5	26.1	1.3	—	1.3	34.2
Scotland	8	0.6	8.0	2.0	—	—	10.6
Staffs., Shrops., Worcs. and Warwick	5	—	3.1	1.3	—	—	4.4
S. Wales and Monmouthshire	7	1.6	18.3	0.3	—	—	20.2
North-West Coast	6	12.3	—	—	—	1.2	13.5
Total	91	20.0	92.6	26.9	0.8	3.2	143.5
June, 1947	91	20.1	98.0	22.8	1.4	2.0	144.3
July, 1946*	99	21.7	98.3	23.0	0.8	3.2	147.0

*Five Weeks.

TABLE III.—*Weekly Average Deliveries of Non-Alloy and Alloy Finished Steels. (Thousands of Tons.)*

Product.	1946.	1947 (Seven months).	1946. July.*	1947. June.	1947. July.*
Non-Alloy Steel:—					
Heavy rails and sleepers	9.0	7.6	8.4	10.4	7.5
Heavy and med. plates	30.9	30.7	26.0	36.5	31.3
Other heavy products	31.9	31.4	28.9	34.6	30.2
Light rolled products (excl. wire rods and alloy steel bars)	48.9	48.3	45.5	53.1	45.9
Ferro-concrete bars	3.2	2.8	3.1	3.0	2.6
Cold-rolled strip	4.2	4.5	4.3	5.1	4.0
Bright steel bars	4.5	4.5	4.2	5.2	4.6
Sheets, coated and uncoated	22.4	24.4	20.9	26.8	22.9
Tin, terne and black-plate	10.4	12.2	10.2	13.8	12.4
Tubes	14.0	12.6	12.4	13.9	11.8
Steel wire	11.8	10.6	11.0	12.0	9.9
Tyres, wheels and axles	3.4	3.3	3.1	3.2	3.2
Forgings	4.9	4.5	4.9	4.4	4.2
Castings	2.9	2.8	2.5	3.1	2.5
Total	202.4	200.2	185.4	225.1	193.0
Alloy Steel†:—					
Plates	0.3	—	0.1	—	—
Tubes	0.2	0.3	0.2	0.4	0.3
Bars, sheets, strip and wire	2.9	3.4	2.2	3.7	3.3
Forgings	1.6	1.5	1.5	1.5	1.6
Castings	0.6	0.6	0.4	0.7	0.4
Total	5.6	5.8	4.4	6.3	5.6
Total Production†	208.0	206.2	189.8	231.4	198.6
Less Intra-industry conversion	16.4	15.7	13.2	18.2	15.5
Total U.K. deliveries	191.6	190.3	176.6	213.2	183.1
Add Deliveries of imported finished steel	—	—	—	—	—
Total finished steel	191.6	190.3	176.6	213.2	183.1

* Five weeks.
† Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.
‡ Excludes high-speed steel.

TABLE I.—*Weekly Average Production of Steel Ingots and Castings, July, 1947.* (Thousands of Tons.)*

District.	Open-hearth Acid.	Open-hearth Basic.	Bessemer.	Electric.	All other.	Total.† Ingots.	Total.† Castings.	Total ingots and castings.
			(Basic)					
Derby, Leics., Notts., Northants and Essex	—	—	9.3	1.1	0.4	10.3	0.5	10.8
Lancs. (excl. N.W. coast), Denbigh, Flints. and Ches. / Yorkshire (excl. N.E. coast and Sheffield)	0.9	16.3	—	0.4	0.3	17.1	0.8	17.9
Lincolnshire	—	16.4	—	—	0.1	16.4	0.1	16.5
North-East Coast	2.5	41.2	—	0.5	0.4	43.5	1.1	44.6
Scotland	3.3	21.5	—	1.3	0.5	25.5	1.1	26.6
Staffs., Shrops., Worcs. and Warwick	—	9.7	—	0.5	0.5	9.8	0.9	10.7
			(Basic)					
S. Wales and Monmouthshire	7.6	36.0	5.1	0.6	0.1	49.1	0.3	49.4
Sheffield	6.5	16.5	—	5.4	0.5	27.7	1.2	28.9
			(Acid)					
North-West Coast	0.3	2.7	3.3	—	—	6.2	0.1	6.3
Total	21.1	160.3	17.7	9.8	2.8	205.6	6.1	211.7
June, 1947	25.0	196.4	17.0	12.3	3.3	246.5	7.5	254.0
July, 1946*	21.8	176.4	17.7	7.7	2.5	220.6	5.5	226.1

* Five weeks. † Including alloy steel.

(Continued at foot of facing page.)

Personal

LADY E. M. BARBER has been appointed a director of the Rheostatic Company, Limited.

LT.-GEN. SIR RONALD M. SCOBIE has been appointed a director of British Insulated Callender's Cables, Limited.

MR. HAROLD HORNSBY has disposed of his interest in Sun Engineering (Crowle), Limited. He intends to settle in South Africa.

SIR FREDERICK BAIN, president of the Federation of British Industries, has returned to this country after visiting Canada, the United States and Australia.

MR. W. R. EADIE, formerly assistant secretary of the Manchester regional office of the Federation of British Industries, has been appointed secretary of the South-Western region of the F.B.I. at Bristol.

MR. A. SADLER, manager of the Haddington Works of William Elder & Sons, Limited, agricultural engineers and ironfounders, of Berwick-upon-Tweed, has been presented with a cheque to mark his completion of 50 years' service with the firm.

MR. E. HUNTER has joined the Incandescent Heat Company, Limited, Smethwick, as manager of the foundry equipment department. Mr. Hunter was at one time with John Harper & Company, Limited, general ironfounders, of Willenhall, and, more recently, foundry manager of the Cannon Ironfoundries, Limited.

SIR MARK HODGSON, general secretary of the United Society of Boiler Makers and Iron and Steel Ship Builders since 1936, is to retire soon. Sir Mark is a member of the General Council of the T.U.C. and president of the Confederation of Shipbuilding and Engineering Unions.

MR. GEORGE WOOD, deputy chairman and joint managing director of Thos. W. Ward, Limited, Sheffield, who has completed 50 years' service with the company, has been presented with an inscribed gold wrist watch by members of the staff. The presentation was made by Mr. F. A. Shirt, the oldest employee of the company

MR. R. G. SIMPSON, who has been chairman of Smethwick Drop Forgings, Limited, since 1936, has found it necessary, for personal reasons, to retire from the board. MR. E. KNIGHT GRATWICK has been appointed chairman. MR. B. H. CREWE and MR. E. DUDLEY GRATWICK have been appointed to the board.

MR. and MRS. DANIEL CROFT, of Stourbridge, celebrated their golden wedding recently. Mr. Croft, with his brother, the late Mr. John Croft, founded, in 1886, the firm of J. & D. Croft & Sons, Limited, galvanisers and hollow-ware manufacturers, of Stourbridge. He is 83 years of age and still takes a very active interest in the business.

SIR IAN BOLTON has accepted the invitation of the Minister of Transport to become a member on a part-time basis of the British Transport Commission. Sir Ian is a member of McClelland, Ker & Company, chartered accountants, of Glasgow and London, a director of the L.M.S. Railway Company, the Coltness Iron Company, Limited, and Smith & Wellstood, Limited.

MR. LESLIE F. WRIGHT, chairman and managing director of Gjers, Mills & Company, Limited, pig-iron manufacturers, of Middlesbrough, has accepted an invitation to contest Middlesbrough West in the next election as a Conservative candidate. He is a member of the Council of the British Iron and Steel Federation and a director of the British Iron & Steel Corporation (Ore), Limited.

MR. I. V. ROBINSON, secretary to the heavy plant sections of the British Electrical and Allied Manufacturers' Association, has been nominated president-elect of the Whitworth Society. He will take office in 1948. Mr. Robinson obtained a Whitworth exhibition in 1900, followed by a scholarship in 1902. He also gained a national scholarship tenable at the Royal College of Science, South Kensington, where he studied for 18 months under the late Prof. John Perry.

Wills

GILLMAN, G. W., of Cheltenham, retired engineer ... £33,550
HEMS, B. A., of Glasgow, engineer's furnisher ... £22,547
MCCALLUM, DUGALD, of Glasgow, of Charles Connell & Company, Limited, engineers and shipbuilders £5,485
RUDDOCK, J. E., of Darlington, a director of the Darlington Railway Plant & Foundry Company, Limited £4,568
TOWN, PERCY, of Halifax, a director of Frederick Town & Sons, Limited, engineers' tool makers, ironfounders, etc. £40,772
BERRY, E. W., of Sowerby Bridge, Yorks, for many years a patternmaker with Francis Berry & Sons, ironfounders £276

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN (*Continued from facing page.*)

TABLE IV.—*General Summary of Pig-iron and Steel Industry.* (*Weekly Average in Thousands of Tons.*)

Period.	Iron-ore output.	Imported ore consumed.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy).			Steel stocks †
					Imports.	Output of ingots and castings.	Deliveries of finished steel.	
1938	228.1	89.2	130.0	117.9	16.2	200.0	—	—
1946	234.1	115.4	149.3	147.0	8.3	244.1	191.6	1,223.9
1947—February	146.4	116.1	126.1	122.7	10.1	206.2	161.2	1,000.5
March	172.1	111.0	123.1	117.7	12.7	196.0	179.2	983.2
April*	207.9	122.1	139.2	144.9	9.3	236.4	199.8	915.4
May	213.9	124.0	141.9	149.5	12.3	243.9	197.8	871.3
June	222.7	125.2	144.3	157.6	7.6	254.0	213.2	865.6
July*	209.7	123.6	143.5	138.2	7.5	211.7	183.1	855.9

* Five weeks. † Stocks at the beginning of the years and months shown.

Company News

(Figures for previous year in brackets.)

Vokes—Dividend of 12½% (same).

Spark Alloys—Interim dividend of 66⅔% (nil).

Tehidy Minerals—Interim dividend of 2½% (5%).

Mountstuart Dry Docks—Dividend of 10¾% (6%).

Newman Industries—Interim dividend of 7½% (same).

Engineering Components—Interim dividend of 10% (same).

Coltness Iron Company—Interim dividend of 5% (same).

Craven Bros. (Manchester)—Interim dividend of 5% (same).

Thomas Robinson & Son—Interim dividend of 2½% (same).

John G. Kincaid & Company—Interim dividend of 3% (same).

Lancashire Dynamo & Crypto—Interim dividend of 5% (same).

Associated Electrical Industries—Interim dividend of 5% (same).

Aerialite—Final dividend of 100% (45%), making 150% (55%).

Rheostatic Company—Interim dividend of 6% on larger capital (4%).

Eustace Watkins—Interim dividend of 10% (nil) and capital dividend of 25% (nil).

Alexander Stephen & Sons—Final dividend of 8% (same) and bonus of 3% (same), making 18% (same).

British Aluminium Company—Interim dividend of 4% (2%). It is stated that the increased interim dividend is to make it more in proportion with the final payment, which last year was 10%.

Thorn Electrical Industries—Net profit for the year ended March 31, after taxation, depreciation, etc., £42,876 (£27,742); to general reserve, £15,000 (same); dividend of 25% (20%); forward, £15,697 (£10,955).

Bennis Combustion—Net profit to April 30, £33,346 (£22,358); income tax, £13,650 (£8,150); profits tax, £2,250 (£1,100); staff fund, £1,000 (same); general reserve, £8,000 (£4,000); final dividend of 7½%, making 12½% (10%); forward, £3,938 (£3,948).

E. H. Bentall & Company—Trading profit for the year ended March 31, after depreciation, £30,889 (£21,096); interest on investments, £979 (£51); taxation, £14,498 (£8,250); net profit, £9,971 (£8,426); dividend of 10% (same); forward, £12,144 (£10,191).

Alliance Aluminium Holdings—Interest and dividends from subsidiaries to June 30, £22,849 (£18,206); bank interest, £86 (£60); to interest on loan, £4,640 (same); directors' fees, £262 (same); expenses, £172 (£161); tax, £8,420 (£6,316); forward, £9,441 (£6,887).

Walker Bros.—Net profit for the year ended March 31, before tax, £29,646 (£23,987); to taxation, £13,272 (£12,073); debenture redemption, £2,176 (£2,077); preference dividend, £2,360 (£2,254); preference redemption, £7,568 (£6,813); ordinary dividend of 7% (same).

George Cohen & Sons—Net profit for the year ended March 31, after tax, £225,892 (£92,956); expenses of new issue of capital written off, £55,298; to general reserve, £65,000 (£25,000); pension fund, £23,679 (£8,050); final dividend of 8%; forward, £40,410 (£33,926).

Steel & Company—Profit for the year ended March 31, £47,740 (£34,954); to fees, £250 (£300); superannuation, £2,500 (£1,700); reserve, £4,800 (£10,000); dividends, £31,644 (£18,664); final dividend of 10% (12½%), making 17½% (same); forward, £28,218 (£19,672).

United Gas Industries—Net profit for the year ended March 31, after taxation, etc., £139,384 (£82,540); final ordinary dividend of 12% (7%), making 17% (12%); dividend on the deferred shares of 1s. 9d. per share (6d.); to general reserve, £25,000 (nil); forward, £29,121 (£25,953).

Berry's Electric—Net profit to March 31, after depreciation, etc., £76,364 (£60,825); to reserve for repairs, £7,500 (nil); income tax, £31,409 (£26,767); reserve for N.D.C., £4,136 (£3,167); general reserve, £22,500 (£20,000); dividend of 12½% (same); forward, £9,724 (£8,599).

Tungsten Manufacturing Company—Trading profit for the year ended September 30, £2,658 (£2,746); debenture interest, £397 (£427); directors' fees, £650 (same); written off investments, £100 (nil); dividend for the half-year to September 30, 1935, on the 6% preference shares; forward, £3,403 (£2,520).

Wales—Trading profit for 1946, £30,859 (£29,037); other income, £1,037 (£964); to directors' fees, £600 (same); depreciation, £3,279 (£2,935); deferred repairs, nil (£2,250); income tax, £10,500 (£9,500); E.P.T., £6,000 (£4,000); net profit, £11,517 (£10,716); final dividend of 10%, making 15% (same); forward, £17,206 (£14,599).

Vaughan Bros. (Drop Forgings)—Profit for the year ended June 30, after providing for depreciation, E.P.T. repayable and interest receivable, £47,287 (£39,547); directors' fees, £575 (£550); income and profits tax, £22,076 (£21,278); to general reserve, £5,000 (nil); final dividend of 10%, making 20% (same); forward, £26,566 (£24,724).

International Aluminium Company—Available balance for 1946, £69,983 (loss, after amortisation, £2,520, leaving available balance £31,519); to directors' fees, £1,075 (£1,035); income tax, £701 (£552); loss on realisation of leasehold land, etc., £54,932 (nil); preference dividend, £9,556 (£9,121); forward, £3,719 (£20,811).

Oldham & Son—Trading, etc., profit to May 31, £184,853 (£174,441); to salaries, depreciation, fees, £25,676 (£28,269); E.P.T., £40,000 (£100,000); profits tax, £6,000 (nil); income tax, £6,472 (£6,103); interest,

£13,955 (£5,249); final dividend of 30% (nil), making 60% (40%); future income tax, £46,000 (nil); forward, £66,303 (£55,897).

Head, Wrightson & Company—Trading profit for the year ended April 30, £170,199 (£102,125); directors' fees, £2,750 (£2,112); interest on debentures, £6,750 (same); taxation, £70,000 (£10,000); depreciation, £30,000 (same); net profit, £61,432 (£63,135); to pensions reserve, £5,000 (£10,000); general purposes reserve, £10,000 (£40,000); final dividend of 7% (6½%), making 10% (9%); forward, £73,163 (£55,701).

Aluminium Corporation—Trading profit for 1946, after depreciation and E.P.T., £61,698 (£66,815, including £24,579 E.P.T. refund and £20,337 release from stock reserve); to loan interest, £4,000 (same); debenture interest, £5,775 (same); directors' fees, £2,150 (£2,070); tax, £21,257 (£20,279); deferred repairs, £10,000 (nil); general reserve, £15,000 (£25,000); dividend of 10% (nil); written off goodwill, nil (£10,000); forward, £5,225 (£5,834).

Sheepbridge Coal & Iron Company—Trading profit for the year ended June 30, including dividends and interest received, and after providing for taxation, £251,683 (£239,258); to interest on debentures, £8,115 (£8,755); depreciation, £31,683 (£43,631); directors' remuneration, £4,000 (same); net profit, £207,885 (£182,872); to general reserve, nil (£20,000); reserve for renewals, £25,000 (same); reserve for pensions, £5,000 (£10,000); reserve for employees' welfare, £10,000 (nil); final dividend of 5%, tax free (same), making 8%, tax free (same); forward, £173,482 (£129,970).

Geevor Tin Mines—Proceeds of tin to March 31, £145,827 (£154,899); other income, £1,940 (£1,599); to mine expenditure, £105,261 (£110,762); development redemption on ore milled, £13,662 (£16,854); royalties, rent, etc., £11,607 (£9,666); administration, etc., £2,682 (£2,631); depreciation, £4,055 (£4,266); taxation, £4,500 (£5,600); written off shaft sinking and permanent development, £1,000 (same); dividend, 10% (same); forward, £7,783 (£8,459). Operations during the year resulted in 45,537 tons of ore being milled, yielding 530 tons of black tin, an average recovery of 26.07 lb. a ton. The relatively small tonnage milled and a reduction in development were directly attributable to the small number of skilled miners available.

Gazette

ALLIED ENGINEERS (BURNLEY), LIMITED, is being wound up voluntarily.

HAYWARD TURBINE ENGINEERING COMPANY, LIMITED, is being wound up voluntarily. Mr. J. Lewin, 28, Maddox Street, London, W.1, is the liquidator. A statutory declaration of solvency has been lodged with the Registrar.

ARMCO, LIMITED, manufacturers of iron strip and bars, etc., of Letchworth, Herts, is being wound up voluntarily for purposes of reconstruction. All creditors have been, or will be, paid in full. Mr. S. H. Pithey, 51, St. Peters Road, Croydon, is the liquidator.

New Patents

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

588,894 PARK FOUNDRY (BELPER), LIMITED, BRATT, L. A., and TUTTON, W. G. G. Solid-fuel grates, stoves, and the like.

589,400 WELLMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED, and KAY, I. Furnace charging apparatus, manipulators for use in forging and other like apparatus.

591,104 ETCHELLS & SON, LIMITED, D., and ETCHELLS, H. F. Machines for forging the heads of bolts and like headed articles.

591,117 MIDLAND MOTOR CYLINDER COMPANY, LIMITED, and WOOLLEY, F. A. Cupola furnaces and the production of iron alloys therein.

591,140 RADIO CORPORATION OF AMERICA. Treatment of metals.

591,150 STANDARD TELEPHONES & CABLES, LIMITED, and MADDOCK, A. J. High-frequency induction heating of metals.

591,222 ALLEGHENY LUDLUM STEEL CORPORATION. Heat-resisting alloy.

591,225 MAGNESIUM ELEKTRON, LIMITED, FOX, F. A., and BUSHROD, C. J. Production of magnesium base alloys.

591,230 WHITTAKER, E. H. Pattern strippers for foundry plants.

591,243 QUARTZ & SILICE. Method of manufacture of refractory products having a base of pure silica.

591,287 COTTRELL, H. L. (CROWN FASTENER CORPORATION.) Method of trimming gates of die castings.

591,294 MENDHAM, J. B. Metal baths.

591,329 STONE & COMPANY, LIMITED, J., and HODGES, E. F. Method of producing dies for use in casting and moulding operations.

591,368 CARNEGIE-ILLINOIS STEEL CORPORATION. Edge scrapers for electrolytic tinning lines and the like.

591,425 BILHAM, W. C. Machines for folding or bending metal sheets.

591,427 PYRENE COMPANY, LIMITED, WRIGHT, W. E. and SCOUSE, S. J. Apparatus for use in coating metal surfaces.

591,460 RHEEM RESEARCH PRODUCTS, INC. Coating of metal articles.

THE SHELL PETROLEUM COMPANY, LIMITED, announce that arrangements have been made for the staff of their fuel oil technical department to return to the city. Office accommodation has been taken at 70-72, King William Street. Correspondence should be addressed to the Shell Petroleum Company, Limited, Fuel Oil General/Technical, St. Helen's Court, Great St. Helen's, London, E.C.3. The fuel oil technical experimental station will remain at 25, Bagley's Lane, Fulham.

Differences in Shipbuilding Costs

The chairman of the Shipbuilding Advisory Committee, Sir Graham Cunningham, was recently invited by the First Lord of the Admiralty and the Minister of Transport to appoint a Committee to examine the differences in shipbuilding costs which, it had been alleged, existed from yard to yard to the disadvantage of the industry as a whole. The Committee, which has an independent chairman, has wide terms of reference. There is no official representation on the Committee. The first public intimation of the existence of the Committee was given at the T.U.C. recently.

The T.U.C. also gave its unanimous support to a resolution urging that the fullest investigation should be made by the Government into the production methods employed by all firms engaged on shipbuilding and shiprepairing, with a view to the co-ordination and standardisation of operations and the types of craft to be constructed in the future to meet the country's most urgent requirements. The resolution also stated that in order to guarantee full employment there should be provision of alternative work for the shipyards as and when the immediate replacements of needs are met.

It is reported that a contract to build two passenger and cargo ships, which had been secured recently by a Clyde company, has now been cancelled by the owners concerned because of the uncertainty of the final prices.

Skinningrove Iron Company's Development Scheme

An important development scheme involving a total estimated outlay of £1,700,000 is announced by the Skinningrove Iron Company, Limited, Saltburn, Yorks. Designed to increase the ingot capacity of the works by about 40 per cent. to 300,000 tons a year, the board project the building of a new blast furnace and a 300-ton open-hearth steel furnace, while the capacity of the 18-in. re-rolling mill is to be increased and new electric generating plant installed. This development plan will, it is estimated, take about three years to complete.

In addition, the Loftus ironstone mine, which has supplied iron ore to the works for a number of years, is being acquired from Pease & Partners, Limited, and from October 1 will be worked direct by the Skinningrove Iron Company.

Up to May last, the Skinningrove Iron Company was a subsidiary of Pease & Partners, Limited. In that month the debenture and share capital was reorganised as a result of which the parent company relinquished control.

In 1945, Sir Wilfrid Garrett, then Chief Inspector of Factories, appointed a committee of machine makers and users with representatives of the Factory Department to advise on better methods for the protection of milling-machine operatives. An interim report by this committee has just been published (H.M. Stationery Office, 1s. 6d. net).

Institute of Management

The aims of the British Institute of Management, limited by guarantee and without share capital, which has recently been formed, are to improve standards of management in Great Britain, encourage education, training, and research in relation thereto, and establish a central institution and study centres. The scope of the Institute covers industrial, commercial, national and local government, public enterprise, agricultural, institutional, and general management.

Membership is unlimited, but the council is to consist of not more than 35, the first members of which are:—Mr. C. G. Renold, chairman, Renold & Coventry Chain Company, Limited; Lord Piercy, chairman, Industrial & Commercial Finance Corporation; Mr. John Ryan, vice-chairman, the Metal Box Company, Limited; Mr. G. Chelioti, a director of the General Electric Company, Limited; Mr. A. M. Holbein, a director of the Demolition & Construction Company, Limited; Mr. A. McKinstry, deputy chairman, Babcock & Wilcox, Limited; Mr. Clive Baillieu, deputy chairman, Dunlop Rubber Company, Limited; Mr. Ronald Dunkerley, managing director, Vantona Textiles, Limited; Mr. J. E. Myers, Principal of the College of Technology, Manchester; and Mr. H. E Rutherford, a director of Venesta, Limited.

Scottish Office for D.S.I.R.

The Department of Scientific and Industrial Research has opened a Scottish office at 18, Melville Street, Edinburgh, to facilitate closer contact with Scotland. The new office will co-operate with the departments of the Secretary of State for Scotland, with the organisations in Scotland of other Government departments, and with voluntary bodies such as the Scottish Council (Development and Industry). It will also study the Scottish industrial position with a view to assisting in the formulation of problems suitable for research. The office will apply existing research facilities as effectively as possible to Scottish needs.

Dr. H. Buckley, who will be in charge of the office, was on the staff of Toronto University before serving for 25 years on the staff of the National Physical Laboratory. During the last war he was for a time a liaison officer in the British Commonwealth Scientific Office in Washington and, during the last three years, was a member of the Intelligence Division at the department's headquarters.

Obituary

Mr. Edward M. Tailby, a director of the Gloucester Shipyard Company, Limited, died on September 12 at Tettenhall. For many years he was County Director of V.A.D. for Birmingham and Assistant County Director for Worcestershire. Mr. Tailby was a Knight of Grace of the Order of St. John of Jerusalem; he was awarded the O.B.E., while he was also the holder of the British Red Cross medal with bar and star.

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Manufactured to guaranteed analyses in seven standard grades. Also obtainable to individual specification

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1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit

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STANTON IRONWORKS
COMPANY LIMITED
NEAR NOTTINGHAM

News in Brief

J. E. HAYDEN, LIMITED, engineers, of Sheffield, have changed their name to Hayden-Nilos, Limited.

HACKBRIDGE & HEWITTIC ELECTRIC COMPANY, LIMITED, Walton-on-Thames, has organised a Canadian company, Hackbridge & Hewittic Electric Company of Canada.

THE BUSINESS OF non-ferrous founders carried on by Joseph Gorman at 18, Chalmers Street, and 48, Millroad Street, Glasgow, has been sold to Donald Sinclair M'Innes, who will carry it on under the name of Joseph Gorman & Sons.

TWENTY-TWO EMPLOYEES of W. & T. Avery, Limited, Soho Foundry, Birmingham, who have completed or exceeded 50 years' service with the company, have been presented with framed illuminated addresses, engraved gold watches, and £10 each.

PALMERS HEBBURN COMPANY, LIMITED, have completed the contract for the reconversion of the Glen Line vessel Breconshire (11,462 tons), which during the war served as an aircraft carrier guarding convoys under the name of H.M.S. Activity. The reconversion has employed about 700 men for nine months.

WM. PICKERSGILL & SONS, LIMITED, Sunderland, have received orders for two 4,500-ton cargo ships. One is for the Booth Steamship Company, to be engined by the North Eastern Marine Engineering Company (1938), Limited, Wallsend-on-Tyne, and the other is for Wm. Cory & Son, Limited, to be engined by John G. Kincaid & Sons, Limited, Greenock.

SUNDERLAND CORPORATION has approved a recommendation by its General Purposes Committee that the Board of Trade be asked to requisition the site of Southwick Shipyard, now closed as a shipyard, for industrial purposes. It was reported to the Council that there was some opposition to the plan to use the land for the making of light Diesel engines on the grounds that it might draw labour from other industries in the town. The new works are expected to employ 300 at the outset, rising to 1,000.

TWELVE EMPLOYEES of the five Ettingshall companies of the John Thompson Engineering Company, Limited, received gold medals commemorating the completion of 50 years' service at a ceremony on September 15. Major S. J. Thompson, deputy chairman of the company, who has himself completed over 60 years' service, said that since their institution in 1924 there had been 4,765 long-service awards made to the employees.

GLASGOW ENGINEERING FIRMS are to organise a permanent exhibition centre in the city. Already about £90,000 has been spent on the acquisition of commodious premises in Sauchiehall Street and their reconstruction and adaptation for exhibition purposes. Assurances have already been received from more than 100 firms that they will be showing in the early days of the exhibition, which is expected to open on a modest scale towards the end of October. Next year the number of exhibitors is expected to exceed 400.

FOLLOWING WIDESPREAD ADOPTION of the model indenture prepared by the Education and Apprenticeship Committee of the Gauge and Tool Makers' Association, the Council has decided to award, under certain conditions, a special certificate to craftsmen in the precision gauge and tool industry. Applications for award of the certificate will be considered from toolmakers who have served a *bona-fide* apprenticeship with a member of the Association and have passed the final examination of the City and Guilds of London Institute machinists', turners', and fitters' course.

NEW OCCIDENTAL GOLD MINES and the Zinc Corporation, Limited, and certain associated companies have reached an agreement for the exploration and examination of mining areas in the Cobar mining field in New South Wales. The arrangement provides for geological and geophysical work on the leases of the New Occidental concern outside those on which operations are at present being conducted and also on certain areas about three miles long by two miles wide which are controlled by Zinc Corporation, Limited. The exploration programme will be carried out by the field staff of the Zinc Corporation.

FOLLOWING THE FORMATION of a new company, Kelvin & Hughes, Limited, to acquire the issued capitals of Kelvin, Bottomley & Baird, Limited, manufacturers of scientific instruments, etc., of Glasgow, and of Henry Hughes & Son, Limited, iron and brass founders, manufacturers of nautical instruments, etc., of Ilford, Essex, shareholders of the two companies have received an offer from the board of the new company to exchange their present holdings for ordinary shares in Kelvin & Hughes, Limited. They have also been invited to apply for a new issue of 200,000 4½ per cent. redeemable cumulative preference shares of £1 each by the new company at 20s. 6d. per share.

Revisions of Export Licensing Control

Changes in export licensing control are made by a new Board of Trade Order (S.R. & O., 1947, No. 1945, H.M. Stationery Office, Kingsway, London, W.C.2, price 1d.), which came into operation last week. In future, no export licences are required for a few domestic gas appliances, and woodworkers' clamps and cramps. Export licences are again required, however, for aluminium and its alloys in unwrought forms.

The detailed changes in the schedules include the following:—

GROUP 6(1).—The following item has been inserted: " Aluminium and alloys mainly thereof in the form of billets, blocks, blooms, cakes, grains, granules, ingots, lumps, notch bars, pellets, shot, slabs, sticks and wire bars."

GROUP 6(2).—The sub-heading relating to domestic gas-heating appliances has been restricted to gas cookers. The item " clamps and cramps, woodworkers " has been deleted from the list of hand and bench tools which are subject to export licence.

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42/44% Al_2O_3
GLENBOIG A.I.
GLENBOIG A.I. CROWN

36/38% Al_2O_3
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CASTLECARY

34/35% Al_2O_3
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EXPORT AGENTS: GENERAL REFRACTORIES LTD., GENEFAX HOUSE, SHEFFIELD 10

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Raw Material Markets

Iron and Steel

There continues to be a very strong and far-reaching demand for foundry pig-iron. All foundries are heavily committed, and licensed quantities are such that there is very little iron to spare beyond current needs, so that stocks at the foundries are very low indeed. Reserves at the furnaces also are at a low level. Some foundries are complaining that they cannot get even the reduced licensed quantities, this applying more particularly to the users of high-phosphorus iron, although it occurs also for low-phosphorus pig-iron. The light foundries are largely engaged on castings for housing needs. The need for these will not be so pressing, in view of revised Government policy, and openings should occur for users of castings wanted for the export trades, which have been difficult to supply for some time past, because of the call for castings at home.

Quite a big percentage of the castings made by the general engineering foundries is wanted by priority industries or represents engineering castings needed in machine construction, etc., for the export trade. The motor industry, of course, also requires a considerable quantity of high-duty castings. These foundries are using as much low- and medium-phosphorus iron as they can get, together with refined iron and hematite. There has, in recent months, been a much wider demand for hematite, because of the stringency in other irons, and makers' outputs have been smaller, due to fuel restrictions; the recent troubles in the Yorkshire coalfield have not improved matters. At present, the hematite makers have difficulty in providing supplies, but there should be some improvement in the last quarter of the year, when increased fuel becomes available, and another furnace on the North-East Coast is operative.

Unfortunately, the scrap position does not improve. There is a dearth of cast iron and suitable steel scrap, and many foundries are now definitely in short supply. Large quantities are essential if trade is to be kept going. In fact, larger supplies than normal are really necessary, because of the pig-iron stringency, yet, owing to the shortage of scrap, foundries are having to put in their mixtures larger quantities of pig-iron, which they can ill spare.

Fortunately, the recent labour troubles in Yorkshire have not affected greatly the flow of coke to the foundries, as the usual sources of supply of this type of coke are Durham and South Wales, with a little from Lancashire The allocated quantities of coke are coming through. Shortly, the smaller allocations for the winter months will apply, but some foundries have been able to put down stocks, owing to the larger allocations which operated for the summer period.

Foundries do not experience any difficulty at the moment in securing their requirements in ganister, limestone and other essentials, but timber for pattern-making is still very difficult.

The re-rollers' position is unchanged. At the most, their stocks of billets or sheet bars are extremely low, and at some places they are working from hand to mouth. It is very difficult for re-rollers to plan even a few weeks ahead because of the shortage of semis. Small supplies are arriving from abroad, but the quantity is nothing like what is needed, and, unfortunately, one cannot see this position improving. The trade is, therefore, thrown largely on the resources of the home makers of semis. Deliveries have improved in the last few months, but the total quantity of steel being received by the re-rollers is nothing like sufficient to keep them in full operation; yet they have very heavy order books, and much of the tonnage on hand is for essential work. The sheet mills are inundated with orders for all classes of sheet, and many of them are booked up for three Periods ahead; but consumers are still clamouring for supplies, and endeavouring to place additional business. Re-rollers will accept readily any offers from the steelworks of defective billets and crops, and also any type of defective finished steel which can be put to good use. A limited supply of electrical steel is utilised by the re-rollers.

There is no easing of the situation at the steelworks for plates, joists and sections. The plate mills have already on hand orders to cover their outputs for at least two periods, and a similar position applies to many sizes of joists, heavy angles and channels. Increasing developments on priority jobs call for heavier supplies of steel, but shipbuilders and other essential users are having reasonable tonnages delivered. Structural engineers all over the country are feeling the dearth of supplies, but, in view of the emphasis which will be placed on export in the future, there will be still further cutting down of supplies.

Non-ferrous Metals

There is a lack of activity in the world copper market which is no doubt attributable, in part, to the world-wide dollar shortage. Owing to this restriction of business, the price in America continues at 21.50 cents per lb., f.a.s. New York, but there is some recognition of the fact that unless financial assistance is forthcoming to enable Europe to buy goods, including metals, in dollars, the United States domestic metal market may take a downward trend.

Recently there has been a considerable quantity of secondary lead available, at a price well below the virgin metal quotation. This is probably due to the fact that holders generally realise that the peak price is past and, consequently, are anxious to dispose of their material as quickly as possible. In view of the fact that, in existing circumstances, fabricators are restricted in their purchases of secondary as well as virgin metal, this position may obtain for some little time yet.

Stocks of zinc in the United Kingdom have fallen to a dangerously low level. The scarcity seems to be most apparent in the electrolytic or high-grade metal, and some consumers have no stocks and are existing on a hand-to-mouth basis.